

# PATENT ABSTRACTS OF JAPAN

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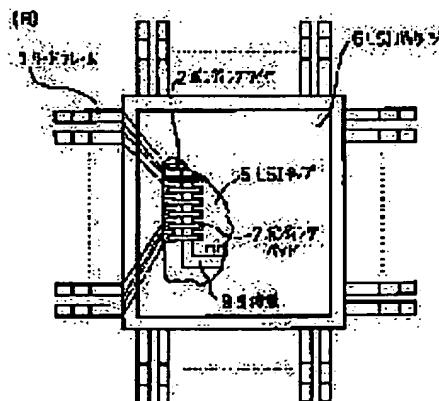
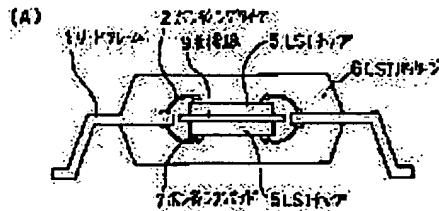
(22) Date of filing : 13.11.1991 (72) Inventor : YOSHINO SUSUMU  
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## (54) INTEGRATED CIRCUIT DEVICE

### (57) Abstract:

PURPOSE: To relax the limits to the integration density and to the number of signal pins of a single LSI chip when the LSI chip is mounted on an integrated circuit package and to relax the influence of a noise caused at the LSI chip and at leads.

CONSTITUTION: A plurality of LSI chips 5 are mounted at the upper part and the lower part so as to sandwich a support plate 9 or a support plate 9 which can be grounded. In such an integrated circuit structure, the LSI chips at the upper part and the lower part are connected to leads or a lead frame 1 by means of bonding wires 2. When the two chips at the upper part and the lower part are die-bonded, they are connected to the leads or the lead frame 1. The leads have a structure which is divided into the upper part and the lower part or into the right and the left so as to sandwich the support plate 9 which can be grounded; they are connected to the individual chips. Thereby, the chips can be integrated highly and mounted at high density, and their noise can be reduced.



## LEGAL STATUS

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**CLAIMS**

[Claim(s)]

[Claim 1] The integrated circuit device characterized by mounting two or more LSI chips in the form which sandwiches a support plate.

[Claim 2] The integrated circuit device characterized by pasting up the rear faces or front faces of an LSI chip on the both sides of a support plate in the integrated circuit device shown in claim 1.

[Claim 3] The integrated circuit device with which the inner lead of an LSI chip is characterized by having the operation as a leadframe in the integrated circuit device shown in claim 1.

[Claim 4] The integrated circuit device characterized by enabling touch-down of a support plate in the integrated circuit device shown in claim 1.

[Claim 5] The integrated circuit device characterized by pulling out in a straight respectively in the integrated circuit device shown in claim 4 in the form which sandwiches a support plate from the LSI chip of the upper and lower sides of a lead.

[Claim 6] The integrated circuit device characterized by pulling out a bonding wire or a lead by turns from a vertical LSI chip as a lead in the integrated circuit device shown in claims 2 and 3.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Industrial Application]** Especially this invention relates to the mounting structure in the integrated circuit package of an LSI chip about an integrated circuit device.

**[0002]**

**[Description of the Prior Art]** As for the mounting technology to the conventional LSI package, the LSI chip was alone mounted in the support plate (die pad), the heat sink, etc. The leadframe and the LSI chip are connected by the bonding wire at this time. Moreover, there is a technique which carries out number chip mounting on a single side like a hybrid IC.

**[0003]**

**[Problem(s) to be Solved by the Invention]** In the conventional integrated circuit device mentioned above, since the LSI chip is mounted alone, a limitation is generated in a degree of integration or the number of signal pins. Moreover, since neither the external lead nor the LSI chip was grounded, it had the trouble of becoming easy to be influenced of a noise.

**[0004]**

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**[0003]**

**[Problem(s) to be Solved by the Invention]** In the conventional integrated circuit device mentioned above, since the LSI chip is mounted alone, a limitation is generated in a degree of integration or the number of signal pins. Moreover, since neither the external lead nor the LSI chip was grounded, it had the trouble of becoming easy to be influenced of a noise.

**[0004]** Moreover, when a number chip is carried in a single side like a hybrid IC etc., a degree of integration needs the surface integral of the LSI chip mounted although it is large, and a led area around it, and has the problem that the whole area becomes large.

**[0005]**

**[Means for Solving the Problem]** The integrated circuit device of this invention is mounted up and down in the form which sandwiches a support plate or an earth plate for two or more LSI chips. And in this integrated-circuit structure, external RIDOHE connection is made by the bonding wire from a vertical LSI chip. Moreover, die bonding of the two chips is carried out up and down, the inner lead of both chips is fabricated as a lead, and it connects with an external lead. This lead is structure divided into the upper and lower sides or right and left on both sides of the support plate in which touch-down is possible, and is connected to each chip. Or there is also structure which pulls out an inner lead as a lead by turns from vertical 2 chip.

**[0006]**

**[Function]** Since the integrated circuit device of this invention is constituted by the above structures, both the area and volume to occupy are reduced, and whenever [ electric electric shielding-with the exterior ] increases, and its electric noise jamming from the outside decreases, and it can have a good operating characteristic.

**[0007]**

**[Example]** Next, this invention is explained with reference to a drawing.

**[0008]** drawing 1 -- the example of claims 1 and 2 of this invention, and drawing 2 R> -- in 2 and 3, the example of claims 1, 2, 3, and 5 and drawing 4 show the example of claims 1, 2, and 3, and drawing 5 shows the example of claims 1, 2, 3, and 4, respectively.

**[0009]** Drawing 1 (A) is drawing of longitudinal section of one example of this invention, and drawing 1 (B) is a plan. the support plate 9 in the LSI package 6 -- die bonding of LSI chip 5 is carried out up and

down, and the bonding wire 2 connects with the leadframe 1 by turns from the bonding pad 7 of the LSI chip of each upper and lower sides.

[0010] drawing 2 (A) -- a part of longitudinal section of other one example of this invention -- a Fig. and drawing 2 (B) -- a part of the top face -- it is a Fig. As inner lead A3 and inner lead B4 which are connected with the bonding pad 7 of LSI chip 5 sandwich the lead support plate 19, they paste up, and they are formed as a lead. Inner lead A3 of the lead support plate 19 and the upper and lower sides and B4 are pasted up through the insulating film 8. Inner leads A and B show the lead which the LSI chip of a support plate 9 top and the bottom connects, respectively here.

[0011] Drawing 2 (A) and (B) are pasted up through the support plate 9 for touch-down so that the front faces of an LSI chip may face each other, and the front face of LSI is protected by rubber 10.

[0012] Next, drawing 3 (C) and (D) are other drawings of longitudinal section and top views of one example of this invention, respectively. Drawing 3 (C) and (D) are one example at the time of drawing 2 (A) and (B) receiving up and down, and pasting up lead (inner lead A) 3 and lead (inner lead B) 4 on a both-sides side on both sides of a support plate 9.

[0013] drawing 4 (A) and (B) -- a part of longitudinal section of other one example of this invention -- a part of Fig. and its top face -- it is a Fig. And as inner lead A3 and inner lead B4 also sandwich a support plate 9, they paste up, and drawing 4 (A) and (B) form a lead for them at the same time they paste up the rear faces of LSI chip 5 through a support plate 9. [ as well as drawing 2 and 3 ]

[0014] drawing 5 (A) and (B) -- a part of longitudinal section of other one example of this invention -- a part of Fig. and its top face -- it is a Fig. moreover, drawing 5 (C) and (D) -- a part of longitudinal section of other one example of this invention -- a part of Fig. and its top face -- it is a Fig. And drawing 5 (A) and (B) are examples when the rear faces of an LSI chip, drawing 5 (C), and (D) paste up the front faces of an LSI chip on a support plate 9.

[0015] And drawing 5 (A), (B), (C), and (D) show the configuration when pulling out by turns the leads (inner leads A and B) 3 and 4 which come out of the bonding pad 7 of the LSI chip 5 as a lead from LSI chip 5 of the upper bottom.

[0016] Moreover, drawing 5 (E) is the expansion partial diagrammatic view of drawing 5 (C). This drawing has shown as one example for grounding. There is lead 3 (inner lead A) connected to LSI chip 5 through the bonding pad 7, and the support plate is connected with the bonding pad 7 through the pad 11 for touch-down in the opposite side. A support plate will also be grounded if this lead is grounded.

[0017]

[Effect of the Invention] As explained above, it became possible to raise the degree of integration conventional by mounting an LSI chip so that a support plate may be inserted of this invention by leaps and bounds.

[0018] Moreover, reduction of a noise can be aimed at by mounting so that a support plate may be grounded and a support plate may be inserted by whenever [ LSI chip or external Lee ], and since the external lead for two chips can be done in one by inserting a support plate (earth plate), it is effective in the ability to perform high-density mounting.

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**TECHNICAL FIELD**

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**PRIOR ART**

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**EFFECT OF THE INVENTION**

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**[Effect of the Invention]** As explained above, it became possible to raise the degree of integration conventional by mounting an LSI chip so that a support plate may be inserted of this invention by leaps and bounds.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] In the conventional integrated circuit device mentioned above, since the LSI chip is mounted alone, a limitation is generated in a degree of integration or the number of signal pins. Moreover, since neither the external lead nor the LSI chip was grounded, it had the trouble of becoming easy to be influenced of a noise.

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**MEANS**

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[Means for Solving the Problem] The integrated circuit device of this invention is mounted up and down in the form which sandwiches a support plate or an earth plate for two or more LSI chips. And in this integrated-circuit structure, external RIDOHE connection is made by the bonding wire from a vertical LSI chip. Moreover, die bonding of the two chips is carried out up and down, the inner lead of both chips is fabricated as a lead, and it connects with an external lead. This lead is structure divided into the upper and lower sides or right and left on both sides of the support plate in which touch-down is possible, and is connected to each chip. Or there is also structure which pulls out an inner lead as a lead by turns from vertical 2 chip.

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**OPERATION**

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**[Function]** Since the integrated circuit device of this invention is constituted by the above structures, both the area and volume to occupy are reduced, and whenever [ electric electric shielding-with the exterior ] increases, and its electric noise jamming from the outside decreases, and it can have a good operating characteristic.

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**EXAMPLE**

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[0010]

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** It is drawing of longitudinal section (A) and the plan (B) of one example of this invention.

**[Drawing 2]** It is partial drawing of longitudinal section (A) and the partial plan (B) of one example of this invention.

**[Drawing 3]** It is drawing of longitudinal section (C) and the plan (D) of one example of this invention.

**[Drawing 4]** It is partial drawing of longitudinal section (A) and the partial plan (B) of one example of this invention.

**[Drawing 5]** It is partial drawing of longitudinal section (A) of one example of this invention, a partial plan (B), and partial drawing of longitudinal section (C) and the partial plan (D) of other one example, and (E) is the enlarged drawing of partial drawing of longitudinal section of (C).

**[Description of Notations]**

- 1 Leadframe
- 2 Bonding Wire
- 3 Lead (Inner Lead A)
- 4 Lead (Inner Lead B)
- 5 LSI Chip
- 6 LSI Package
- 7 Bonding Pad
- 8 Insulating Film
- 9 Support Plate
- 10 Rubber
- 11 Pad for Touch-down
- 19 Lead Support Plate

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**[Translation done.]**

(19)日本国特許庁 (JP)

## (12) 公開特許公報 (A)

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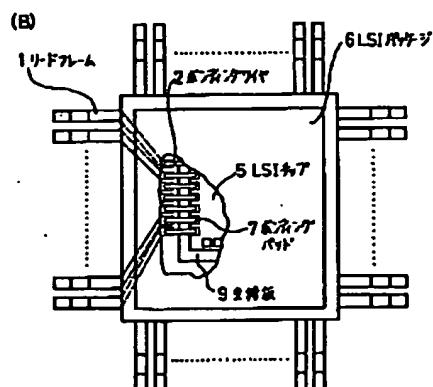
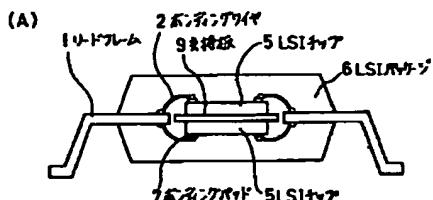
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(54)【発明の名称】 集積回路装置

(57)【要約】

【目的】 集積回路パッケージにLSIチップを実装する場合にLSIチップ単体では、集積度や信号ビン数に限界がある。また、LSIチップやリードはノイズの影響を受け易いため、これらを緩和することを目的とする。

【構成】 複数のLSIチップ5は支持板9または、接地可能な支持板を挟む形で上下に実装されている。そしてこの集積回路構造において、上下LSIチップからボンディングワイヤ2によりリードまたはリードフレーム1へ接続する。また上下の2チップをダイボンディングすることによりリードまたはリードフレーム1と接続する。このリードは、接地可能な支持板9を挟んで上下または左右に分割される構造であり、各々のチップに接続されている。これにより、高集積で高密度な実装が可能となり、かつノイズの低減を図れるようになった。



(2)

特開平5-136323

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## 【特許請求の範囲】

【請求項 1】 複数のLSIチップを支持板を挟む形で実装することを特徴とする集積回路装置。

【請求項 2】 請求項1に示した集積回路装置において、支持板の両側にLSIチップの裏面同士または表面同士を接着したことを特徴とする集積回路装置。

【請求項 3】 請求項1に示した集積回路装置において、LSIチップのインナーリードが、リードフレームとしての作用を有することを特徴とする集積回路装置。

【請求項 4】 請求項1に示した集積回路装置において、支持板を接地可能とすることを特徴とする集積回路装置。

【請求項 5】 請求項4に示した集積回路装置において、リードを上下のLSIチップから支持板を挟む形で各々ストレートに引き出すことを特徴とする集積回路装置。

【請求項 6】 請求項2, 3に示した集積回路装置において、リードとして上下LSIチップからボンディングワイヤまたは、リードを交互に引き出したことを特徴とする集積回路装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、集積回路装置に関し、特にLSIチップの集積回路パッケージにおける実装構造に関する。

## 【0002】

【従来の技術】 従来のLSIパッケージへの実装技術は、LSIチップが支持板（ダイ・パッド）や放熱板等に単体で実装されていた。この時、リードフレームとLSIチップは、ボンディングワイヤにより接続されている。また、ハイブリッドICのように單一面で数チップ実装する技術がある。

## 【0003】

【発明が解決しようとする課題】 上述した従来の集積回路装置では、LSIチップが単体で実装されているため、集積度や信号ビン数に限界が生ずる。また、外部リードやLSIチップは、接地されていないため、ノイズの影響を受け易くなるという問題点があった。

【0004】 また、ハイブリッドIC等のごとく單一面に数チップが搭載される場合は、集積度は大きいが実装するLSIチップの面積分とその周りのリード分の面積を必要とし全体の面積が大きくなるという問題がある。

## 【0005】

【課題を解決するための手段】 本発明の集積回路装置は、複数のLSIチップを支持板または、接地板を挟む形で上下に実装している。そして、この集積回路構造において上下LSIチップからボンディングワイヤにより外部リードへ接続する。また、上下に2チップをダイボンディングし、両チップのインナーリードをリードとして成形し外部リードと接続する。このリードは、接地可

能な支持板を挟んで上下または左右に分割される構造であり、各々のチップに接続されている。或いは、上下2チップから交互にインナーリードをリードとして引き出す構造もある。

## 【0006】

【作用】 本発明の集積回路装置は上記のような構造に構成されるので、占有する面積と体積が共に縮小され、また外部との電気的遮蔽度が増大し、外部からの電気的雑音妨害が少くなり、良好な動作特性を持つことができる。

## 【0007】

【実施例】 次に本発明について図面を参照して説明する。

【0008】 図1は本発明の請求項1, 2の実施例、図2, 3は請求項1, 2, 3, 5の実施例、図4は請求項1, 2, 3の実施例、図5は請求項1, 2, 3, 4の実施例をそれぞれ示している。

【0009】 図1（A）は、本発明の一実施例の縦断面図であり、図1（B）は、上面図である。LSIパッケージ6内の支持板9の上下にLSIチップ5がダイボンディングされており、上下各々のLSIチップのボンディングパッド7から交互にボンディングワイヤ2によりリードフレーム1に接続されている。

【0010】 図2（A）は、本発明の他の一実施例の縦断面の一部分図、図2（B）は、その上面の一部分図である。LSIチップ5のボンディングパッド7と接続されているインナーリードA3、インナーリードB4がリード支持板19を挟むようにして接着され、リードとして形成されている。リード支持板19と上下のインナーリードA3, B4は、絶縁フィルム8を介して接着されている。ここにインナーリードAとBとはそれぞれ支持板9の上と下のLSIチップの接続するリードを示す。

【0011】 図2（A）、（B）は、LSIチップの表面同士が向き合うように接地用の支持板9を介して接着し、LSIの表面はラバー10により保護されている。

【0012】 次に図3（C）、（D）はそれぞれ本発明の他の一実施例の縦断面図と平面図である。図3（C）、（D）は、リード（インナーリードA）3、リード（インナーリードB）4を図2（A）、（B）の上下に対し、支持板9を挟んで両側面に接着した場合の一実施例である。

【0013】 図4（A）、（B）は本発明の他の一実施例の縦断面の一部分図とその上面の一部分図である。そして図4（A）、（B）は、LSIチップ5の裏面同士を支持板9を介して接着すると同時に、図2, 3と同様にインナーリードA3、インナーリードB4も支持板9を挟むようにして接着し、リードを形成する。

【0014】 図5（A）、（B）は本発明の他の一実施例の縦断面の一部分図とその上面の一部分図である。また図5（C）、（D）も本発明の他の一実施例の縦断面

(3)

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の一部分図とその上面の一部分図である。そして図5 (A), (B) は L S I チップの裏面同士、図5 (C), (D) は L S I チップの表面同士を支持板9に接着した場合の実施例である。

【0015】そして図5 (A), (B), (C), (D) は L S I チップ5のボンディングパッド7から出るリード (インナーリードA, B) 3, 4を上、下のL S I チップ5から交互にリードとして引き出したときの構成を示す。

【0016】また、図5 (E) は、図5 (C) の拡大部分図である。この図では、接地するための一実施例として示してある。ボンディングパッド7を介して L S I チップ5に接続されているリード3 (インナーリードA) があり、ボンディングパッド7と反対側に接地用パッド11を介して支持板が接続されている。このリードを接地すれば支持板も接地されることになる。

【0017】

【発明の効果】以上説明したように本発明は、支持板を挟むように L S I チップを実装することで従来の集積度を飛躍的に向上させることができた。

【0018】また、支持板を接地して L S I チップや外部リードで支持板を挟むように実装することで、ノイズの低減を図ることができ、2チップ分の外部リードを支持板 (接地板) を挟むことで1本にできるため、高密度な実装ができるという効果がある。

【図面の簡単な説明】

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【図1】本発明の一実施例の縦断面図 (A) と上面図 (B) である。

【図2】本発明の一実施例の部分縦断面図 (A) と部分上面図 (B) である。

【図3】本発明の一実施例の縦断面図 (C) と上面図 (D) である。

【図4】本発明の一実施例の部分縦断面図 (A) と部分上面図 (B) である。

【図5】本発明の一実施例の部分縦断面図 (A) と部分上面図 (B) 及び他の一実施例の部分縦断面図 (C) と部分上面図 (D) であり、また (E) は (C) の部分縦断面図の拡大図である。

【符号の説明】

- |    |                |
|----|----------------|
| 1  | リードフレーム        |
| 2  | ボンディングワイヤ      |
| 3  | リード (インナーリードA) |
| 4  | リード (インナーリードB) |
| 5  | L S I チップ      |
| 6  | L S I パッケージ    |
| 7  | ボンディングパッド      |
| 8  | 絶縁フィルム         |
| 9  | 支持板            |
| 10 | ラバー            |
| 11 | 接地用パッド         |
| 19 | リード支持板         |

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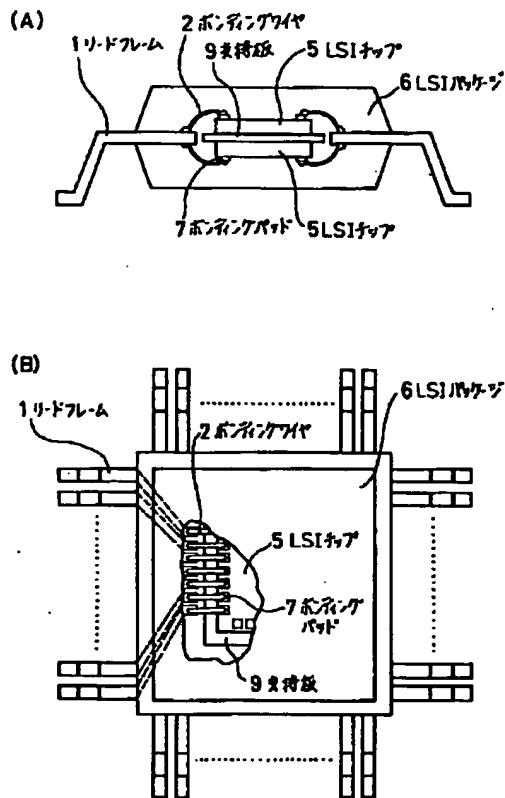
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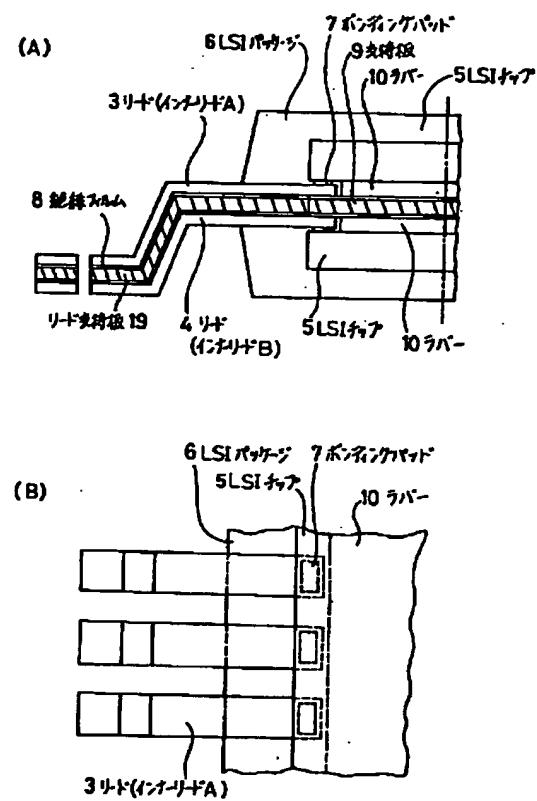
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【図1】



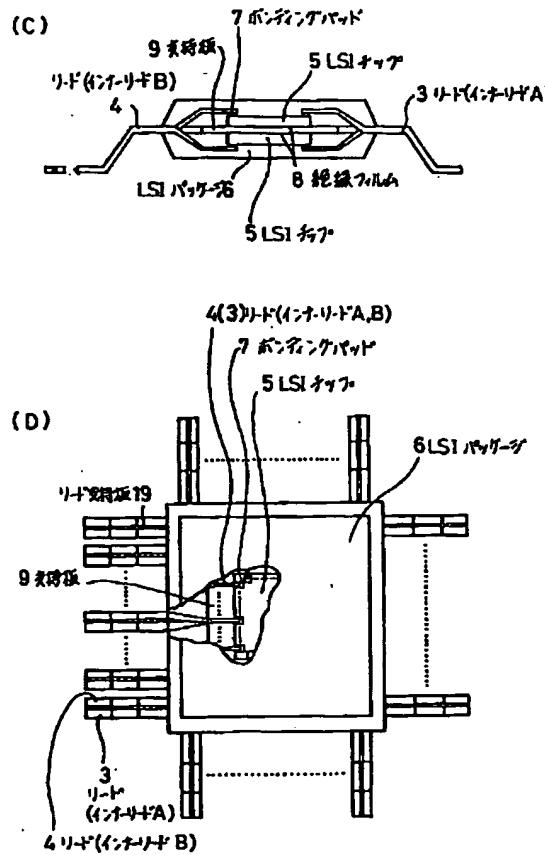
【図2】



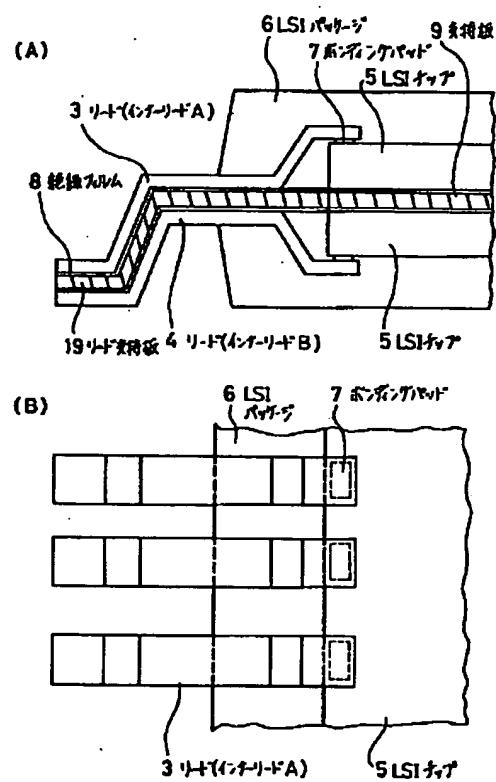
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【図3】



【図4】



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【図5】

